

## Claims

1. A process for producing a catalyst for hydrodesulfurization and isomerization of a sulfur-containing hydrocarbon oil, which comprises supporting palladium on a composition comprising a platinum-supported sulfated zirconia and alumina.

2. The process for producing a catalyst according to claim 1, which comprises the following production steps:

(1) an alumina-mixing step of mixing a platinum-supported sulfated zirconium hydroxide and pseudoboehmite;

(2) a molding step of molding the resulting mixture into a catalyst form;

(3) a calcining step of calcining the molded form to stabilize it; and

(4) a palladium-supporting step of supporting palladium.

3. A catalyst produced by the process according to claim 1 or 2, which has a platinum content of 0.05 to 5% by weight, a palladium content of 0.05 to 10% by weight, and a specific surface area of 50 to 200 m<sup>2</sup>/g.

4. A method for hydrodesulfurization and isomerization of a sulfur-containing hydrocarbon oil, which comprises allowing a light hydrocarbon oil having a sulfur content of 700 ppm by weight or lower and hydrogen to contact with the catalyst according to claim 3 under reaction conditions at a temperature of 160 to 300°C, a pressure of 1.0 to 10.0 MPa, an LHSV of 0.1 to 10 h<sup>-1</sup>, and a hydrogen/oil ratio of 100 to 1,000 NL/L to achieve isomerization and desulfurization simultaneously.